

preferably 10 MPa to 100 MPa, and the Barcol hardness (A value) is 30 or more, and preferably 35 to 55, while the Barcol hardness (B value) is 50 or more, and preferably 50 to 95. If the tensile strength of the casting plate is less than 10 MPa, the plate has insufficient strength as a mold. If the tensile strength of the casting plate is greater than 100 MPa, the result may be an excessive design. If the Barcol hardness (A value) is less than 30, surface smoothness may be impaired due to susceptibility of the molded article surface to temperature changes. The Heat Deflection temperature of said casting plate is preferably 60°C or more, and preferably 90°C or more. Furthermore, either epoxy(meth)acrylate alone or its mixture with another polymerization curable unsaturated resin is preferably selected for the above polymerization curable unsaturated resin. By selecting in this manner, the molded article of the present invention is obtained that has ample elongation while maintaining comparatively high strength and Heat Deflection temperature (HDT), namely a molded article can be obtained that has high toughness, high heat resistance strength and satisfactory moisture resistance.

If the tensile elongation percentage of the casting plate obtained by curing the curable resin composition used for intermediate layer (B) of the present invention is less than 2%, cracks form more easily in the gel coating as comparison with the case of not providing an intermediate layer (B) if deflection or deformation occurs in the molded article. In addition, if the tensile elongation percentage of the above casting plate exceeds 50%, the previously mentioned prevention of cracking in the gel coating is better than in the case of not providing intermediate layer (B). However, there is increased susceptibility to print through by the fiber pattern during formation of the next fiber-reinforced plastic layer (C), and surface smoothness, which is the inherent object, tends to become poor over time.

The amount of filler used in intermediate layer (B) is 30 to 150 parts by weight, and preferably 60 to 100 parts by weight, relative to 100 parts by weight of the curable resin composition. If the amount of the filler exceeds 150 parts by weight, in addition to spraying becoming difficult to the increased viscosity, there are also disadvantages such as the allowable range of the amount of deflection deformation of the molded article with respect to the formation of cracks in the gel coating becoming smaller. In addition, even if the intermediate layer (B) contains the filler in an amount of less than 30 parts by weight, print through of the fiber pattern from the fiber-reinforced plastic layer can no longer be

prevented.

The amount of thixotropic agent used in the intermediate layer (B) of the present invention is 1 to 4 parts by weight, and preferably 2 to 3 parts by weight, relative to 100 parts by weight of the curable resin composition. If the amount of thixotropic agent is outside the above range, namely less than 1 part by weight or greater than 4 parts by weight, spraying becomes difficult and problems such as the occurrence of running and defective leveling occur during spraying with a sprayer onto vertical surfaces. Since the intermediate layer of uniform thickness can therefore not be obtained, the gel coating surface has poor surface smoothness.

In addition, the gelation time and the viscosity of the curable resin composition used in the intermediate layer (B) of the present invention differ depending on the mixing method of the curing agent of the coating apparatus.

1) In the case of using a curable resin composition into which a curing agent has been blended in advance, the curable resin composition is supplied for each blended batch, and in the case of using a pneumatic spray gun that atomizes using compressed air, the gelation time of said curable resin composition is preferably 10 to 30 minutes, the viscosity is 20 to 40 poise, and the thixotropy is preferably 4 to 9. If the gelation time is within the above range, gelation inside the spray gun can be controlled during spraying, and if the viscosity is within the above range, spraying with a pneumatic spray gun becomes easier, thereby making this preferable.

2) In the case of using a plunger pump type of air spray gun in which the curing agent is mixed in the end of the spray nozzle (internal mixing) or the curing agent is simultaneously sprayed from a different nozzle in the form of spray mixing (external mixing), the gelation time of the curable resin composition blended with the curing agent is 3 to 8 minutes, the viscosity is greater than 40 poise but not more than 70 poise, and the thixotropy is preferably 4 to 9. Since gelation inside the spray gun does not present a problem in the case of using a plunger pump type of air spray gun using internal mixing or external mixing, it is not necessary to prolong the gelation time as in the manner of the case of the air gun previously mentioned, and when considering the molding cycle, a shorter gelation time is preferable. In addition, the viscosity of the intermediate layer composition is preferably greater than 40 but not more than 100 poise. This is preferable for high filling of filler from the perspective of preventing separation and settling during

storage and inhibiting volatilization of styrene.

The above-mentioned unsaturated polyester is obtained in a reaction between dibasic acid containing an  $\alpha,\beta$ -unsaturated dibasic acid and polyhydric alcohol, and if necessary, dicyclopentadiene compound. The unsaturated polyester preferably has a molecular weight within the range of 500 to 5000.

Examples of  $\alpha,\beta$ -unsaturated dibasic acids used in the preparation of the unsaturated polyester include maleic acid, maleic anhydride, fumaric acid, itaconic acid, and itaconic anhydride. Examples of the saturated dibasic acids include phthalic acid, phthalic anhydride, halogenated phthalic anhydride, isophthalic acid, terephthalic acid, tetrahydrophthalic acid, tetrahydrophthalic anhydride, hexahydrophthalic acid, hexahydrophthalic anhydride, hexahydroterephthalic acid, hexahydroisophthalic acid, succinic acid, malonic acid, glutaric acid, adipic acid, sebacic acid, 1,12-didodecanoic acid, 2,6-naphthalenedicarboxylic acid, 2,7-naphthalenedicarboxylic acid, 2,3-naphthalenedicarboxylic acid, 2,3-naphthalenedicarboxylic anhydride, 4,4'-biphenyldicarboxylic acid, and their dialkyl esters.

Examples of polyhydric alcohols include ethylene glycol, diethylene glycol, triethylene glycol, polyethylene glycol, propylene glycol, dipropylene glycol, polypropylene glycol, 2-methyl-1,3-propanediol, 1,3-butanediol, neopentyl glycol, bisphenol A hydride, 1,4-butanediol, addition products of bisphenol A and propylene oxide or ethylene oxide, 1,2,3,4-tetrahydroxybutane, glycerin, trimethylolpropane, 1,3-propanediol, 1,2-cyclohexane glycol, 1,3-cyclohexane glycol, 1,4-cyclohexane glycol, 1,4-cyclohexane dimethanol, paraxylene glycol, bicyclohexyl-4,4'-diol, 2,6-decalin glycol, and 2,7-decalin glycol. These may be used alone or by combining two or more types.

Examples of the above epoxy(meth)acrylate include di(meth)acrylates of bisphenol type epoxy resins, di(meth)acrylates of novolak type epoxy resins, and di(meth)acrylates of 1,6-naphthalene type epoxy resins, which are obtained by reacting epoxy resin, preferably having an average epoxy equivalent within the range of 150 to 450, with unsaturated monobasic acid in the presence of esterification catalyst.

Examples of the above bisphenol type epoxy resins include bisphenol A epoxy resin, hydrogenated bisphenol A epoxy resin, bisphenol A ethylene oxide addition epoxy resin, bisphenol A propylene oxide addition epoxy resin, bisphenol F epoxy resin, 1,6-naphthalene epoxy resin, and the like.